SEQUENCE LISTING

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PHADTARE, SANGITA
YAMANAKA, KUNITOSHI
KATO, IKUNOSHIN

<120> GENE ENCODING A 4,5 DIHYDROXY-2-CYCLOPENTEN-1-ONE (DHCP) EFFLUX PROTEIN PROMOTING RESISTANCE TO DHCP

<130> 1137-R-00

<140> 09/805,681
<141> 2001-03-14

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<170> PatentIn Ver. 2.1

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35 40 45

Tyr Ala Val Gly Val Met Val Gly Ala Pro Leu Met Thr Leu Leu Leu
50 55 60

Ser His Arg Ala Arg Arg Ser Ala Leu Ile Phe Leu Met Ala Ile Phe
65 70 75 80

Thr Leu Gly Asn Val Leu Ser Ala Ile Ala Pro Asp Tyr Met Thr Leu
85 90 95

Met Leu Ser Arg Ile Leu Thr Ser Leu Asn His Gly Ala Phe Phe Gly
100 105 110

Leu Gly Ser Val Val Ala Ala Ser Val Val Pro Lys His Lys Gln Ala
115 120 125

Ser Ala Val Ala Thr Met Phe Met Gly Leu Thr Leu Ala Asn Ile Gly
130 135 140

Gly Val Pro Ala Ala Thr Trp Leu Gly Glu Thr Ile Gly Trp Arg Met
145 150 155 160

Ser Phe Leu Ala Thr Ala Gly Leu Gly Val Ile Ser Met Val Ser Leu
165 170 175

Phe Phe Ser Leu Pro Lys Gly Gly Ala Gly Ala Arg Pro Glu Val Lys
180 185 190

Lys Glu Leu Ala Val Leu Met Arg Pro Gln Val Leu Ser Ala Leu Leu
195 200 205

Thr Thr Val Leu Gly Ala Gly Ala Met Phe Thr Leu Tyr Thr Tyr Ile
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Ser Pro Val Leu Gln Ser Ile Thr His Ala Thr Pro Val Phe Val Thr
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Ala Met Leu Val Leu Ile Gly Val Gly Phe Ser Ile Gly Asn Tyr Leu
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Gly Gly Lys Leu Ala Asp Arg Ser Val Asn Gly Thr Leu Lys Gly Phe
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Leu Leu Leu Leu Met Val Ile Met Leu Ala Ile Pro Phe Leu Ala Arg
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Asn Glu Phe Gly Ala Ala Ile Ser Met Val Val Trp Gly Ala Ala Thr
    290                 295                 300

Phe Ala Val Val Pro Pro Leu Gln Met Arg Val Met Arg Val Ala Ser
305                 310                 315                 320

Glu Ala Pro Gly Leu Ser Ser Ser Val Asn Ile Gly Ala Phe Asn Leu
                325                 330                 335

Gly Asn Ala Leu Gly Ala Ala Ala Gly Gly Ala Val Ile Ser Ala Gly
            340                 345                 350

Leu Gly Tyr Ser Phe Val Pro Val Met Gly Ala Ile Val Ala Gly Leu
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Cys Val Ala Asn Ser
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<213> Rhodococcus fascians

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             20                  25                  30

Leu Gln Val Ser Val Pro Thr Ala Gly Leu Leu Thr Ser Ala Phe Ala
         35                  40                  45

Ile Gly Met Ile Ile Gly Ala Pro Leu Met Ala Ile Val Ser Met Arg
     50                  55                  60

Trp Gln Arg Arg Arg Ala Leu Leu Thr Phe Leu Ile Thr Phe Met Val
 65                  70                  75                  80

Val His Val Ile Gly Ala Leu Thr Asp Ser Phe Gly Val Leu Leu Val
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Thr Arg Ile Val Gly Ala Leu Ala Asn Ala Gly Phe Leu Ala Val Ala
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Leu Gly Ala Ala Met Ser Met Val Pro Ala Asp Met Lys Gly Arg Ala
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Thr Ser Val Leu Leu Gly Gly Val Ile Ile Ala Cys Val Val Gly Val
    130                 135                 140

Pro Gly Gly Ala Leu Leu Gly Glu Leu Trp Gly Trp Arg Ala Ser Phe
145                 150                 155                 160

Trp Glu Val Val Leu Ile Ser Ala Pro Ala Val Ala Ala Ile Met Ala
                165                 170                 175

Ser Thr Pro Ala Asp Ser Pro Thr Asp Ser Val Pro Asn Ala Thr Arg
            180                 185                 190

Glu Leu Ser Ser Leu Arg Gln Arg Lys Leu Gln Leu Ile Leu Val Leu
        195                 200                 205

Gly Ala Leu Ile Asn Gly Ala Thr Phe Cys Ser Phe Thr Tyr Leu Ala
    210                 215                 220

Pro Thr Leu Thr Asp Val Ala Gly Phe Asp Ser Arg Trp Ile Pro Leu
225                 230                 235                 240

Leu Leu Gly Leu Phe Gly Leu Gly Ser Phe Ile Gly Val Ser Val Gly
                245                 250                 255

Gly Arg Leu Ala Asp Thr Arg Pro Phe Gln Leu Leu Val Ala Gly Ser
            260                 265                 270

Ala Ala Leu Leu Val Gly Trp Ile Val Phe Ala Ile Thr Ala Ser His
        275                 280                 285

Pro Val Val Thr Leu Val Met Leu Phe Val Gln Gly Thr Leu Ser Phe
    290                 295                 300

Ala Val Gly Ser Thr Leu Ile Ser Arg Val Leu Tyr Val Ala Asp Gly
305                 310                 315                 320

Ala Pro Thr Leu Gly Gly Ser Phe Ala Thr Ala Ala Phe Asn Val Gly
                325                 330                 335

Ala Ala Leu Gly Pro Ala Leu Gly Gly Val Ala Ile Gly Ile Gly Met
            340                 345                 350

Gly Tyr Arg Ala Pro Leu Trp Thr Ser Ala Ala Leu Val Ala Leu Ala
        355                 360                 365

Ile Val Ile Gly Ala Ala Thr Trp Thr Arg Trp Arg Glu Pro Arg Pro
    370                 375                 380

Ala Leu Asp Thr Val Pro Pro
385                 390
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<212> PRT
<213> Rhodococcus erythropolis

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             20                  25                  30

Leu Gly Val Ser Val Pro Ala Ala Gly Leu Leu Thr Ser Ala Phe Ala
         35                  40                  45

Val Gly Met Ile Ile Gly Ala Pro Leu Met Ala Ile Ala Ser Met Arg
     50                  55                  60

Trp Pro Arg Arg Arg Ala Leu Leu Thr Phe Leu Ile Thr Phe Met Leu
 65                  70                  75                  80

Val His Val Ile Gly Ala Leu Thr Ser Ser Phe Glu Val Leu Leu Val
                 85                  90                  95

Thr Arg Ile Val Gly Ala Leu Ala Asn Ala Gly Phe Leu Ala Val Ala
            100                 105                 110

Leu Gly Ala Ala Met Ala Met Val Pro Ala Asp Met Lys Gly Arg Ala
        115                 120                 125

Thr Ser Val Leu Leu Gly Gly Val Ile Ile Ala Cys Val Ala Gly Val
    130                 135                 140

Pro Gly Gly Ala Phe Leu Gly Glu Ile Trp Gly Trp Arg Ala Ala Phe
145                 150                 155                 160

Trp Ala Val Val Val Ile Ser Ala Pro Ala Val Val Ala Ile Met Phe
                165                 170                 175

Ala Thr Pro Ala Glu Pro Pro Ala Glu Ser Thr Pro Asn Ala Lys Arg
            180                 185                 190

Glu Leu Ser Ser Leu Arg Ser Arg Lys Leu Gln Leu Met Leu Val Leu
        195                 200                 205

Gly Ala Leu Ile Asn Gly Ala Thr Phe Cys Ser Phe Thr Tyr Met Ala
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Pro Thr Leu Thr Asp Ile Ser Gly Phe Asp Ser Arg Trp Ile Pro Leu
225                 230                 235                 240

Leu Leu Gly Leu Phe Gly Leu Gly Ser Phe Ile Gly Val Ser Val Gly
                245                 250                 255

Gly Arg Leu Ala Asp Thr Arg Pro Phe Gln Leu Leu Ala Val Gly Ser
            260                 265                 270

Ala Ala Leu Leu Thr Gly Trp Ile Val Phe Ala Leu Thr Ala Ser His
        275                 280                 285
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Pro Ala Val Thr Leu Val Met Leu Phe Val Gln Gly Ala Leu Ser Phe
    290                 295                 300

Ala Val Gly Ser Thr Leu Ile Ser Gln Val Leu Tyr Ala Ala Asp Ala
305                 310                 315                 320

Ala Pro Thr Leu Gly Gly Ser Phe Ala Thr Ala Ala Phe Asn Val Gly
                325                 330                 335

Ala Ala Leu Gly Pro Ala Leu Gly Gly Leu Ala Ile Gly Met Gly Leu
            340                 345                 350

Ser Tyr Arg Ala Pro Leu Trp Thr Ser Ala Ala Leu Val Thr Leu Ala
        355                 360                 365

Ile Val Ile Gly Ala Ala Thr Leu Ser Leu Trp Arg Arg Pro Ala Ser
    370                 375                 380

Val Gln Glu Thr Val Pro Ala
385                 390
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<212> PRT
<213> Streptomyces lividans

<400> 6

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             20                  25                  30

Leu Gly Val Thr Val Gly Thr Ala Gly Thr Leu Thr Ser Ala Phe Ala
         35                  40                  45

Thr Gly Met Ile Val Gly Ala Pro Leu Val Ala Ala Leu Ala Arg Thr
     50                  55                  60

Trp Pro Arg Arg Ser Ser Leu Leu Gly Phe Ile Leu Ala Phe Ala Ala
 65                  70                  75                  80

Ala His Ala Val Gly Ala Gly Thr Thr Ser Phe Pro Val Leu Val Ala
                 85                  90                  95

Cys Arg Val Val Ala Ala Leu Ala Asn Ala Gly Phe Leu Ala Val Ala
            100                 105                 110

Leu Thr Thr Ala Ala Ala Leu Val Pro Ala Asp Lys Gln Gly Arg Ala
        115                 120                 125

Leu Ala Val Leu Leu Ser Gly Thr Thr Val Ala Thr Val Ala Gly Val
    130                 135                 140

Pro Gly Gly Ser Leu Leu Gly Thr Trp Leu Gly Trp Arg Ala Thr Phe
145                 150                 155                 160
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Trp Ala Val Ala Val Cys Cys Leu Pro Ala Ala Phe Gly Val Leu Lys
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Ala Ile Pro Ala Gly Arg Ala Thr Ala Ala Ala Thr Gly Gly Pro Pro
            180                 185                 190

Leu Arg Val Glu Leu Ala Ala Leu Lys Thr Pro Arg Leu Leu Leu Ala
        195                 200                 205

Met Leu Leu Gly Ala Leu Val Asn Ala Ala Thr Phe Ala Ser Phe Thr
    210                 215                 220

Phe Leu Ala Pro Val Val Thr Asp Thr Ala Gly Leu Gly Asp Leu Trp
225                 230                 235                 240

Ile Ser Val Ala Leu Val Leu Phe Gly Ala Gly Ser Phe Ala Gly Val
                245                 250                 255

Thr Val Ala Gly Arg Leu Ser Asp Arg Arg Pro Ala Gln Val Leu Ala
            260                 265                 270

Val Ala Gly Pro Leu Leu Leu Val Gly Trp Pro Ala Leu Ala Met Leu
        275                 280                 285

Ala Asp Arg Pro Val Ala Leu Leu Thr Leu Val Phe Val Gln Gly Ala
    290                 295                 300

Leu Ser Phe Ala Leu Gly Ser Thr Leu Ile Thr Arg Val Leu Tyr Glu
305                 310                 315                 320

Ala Ala Gly Ala Pro Thr Met Ala Gly Ser Tyr Ala Thr Ala Ala Leu
                325                 330                 335

Asn Val Gly Ala Ala Ala Gly Pro Leu Val Ala Ala Thr Thr Leu Gly
            340                 345                 350

His Thr Thr Gly Asn Leu Gly Pro Leu Trp Ala Ser Gly Leu Leu Val
        355                 360                 365

Ala Val Ala Leu Leu Val Ala Phe Pro Phe Arg Thr Val Ile Thr Thr
    370                 375                 380

Ala Ala Pro Ala Asp Ala Thr Arg
385                 390
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<212> PRT
<213> Corynebacterium striatum

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            20                  25                  30
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Leu Asp Val Ser Val Gly Thr Ala Gly Leu Leu Thr Ser Ala Phe Ala
        35                  40                  45

Val Gly Met Val Val Gly Ala Pro Val Met Ala Ala Phe Ala Arg Arg
    50                  55                  60

Trp Ser Pro Arg Leu Thr Leu Ile Val Cys Leu Leu Val Phe Ala Gly
65                  70                  75                  80

Ser His Val Ile Gly Ala Met Thr Pro Val Phe Ser Leu Leu Leu Ile
                85                  90                  95

Thr Arg Val Leu Ser Ala Leu Ala Asn Ala Gly Phe Leu Ala Val Ala
            100                 105                 110

Leu Ser Thr Ala Thr Thr Leu Val Pro Ala Asn Gln Lys Gly Arg Ala
        115                 120                 125

Leu Ser Ile Leu Leu Ser Gly Thr Thr Thr Ala Thr Val Val Gly Val
    130                 135                 140

Pro Ala Gly Ala Leu Leu Gly Thr Ala Leu Gly Trp Arg Thr Thr Phe
145                 150                 155                 160

Trp Ala Ile Ala Ile Leu Cys Ile Pro Ala Ala Val Gly Val Ile Arg
                165                 170                 175

Gly Val Thr Asn Asn Val Gly Arg Ser Glu Thr Ser Ala Thr Ser Pro
            180                 185                 190

Arg Leu Arg Val Glu Leu Ser Gln Leu Ala Thr Pro Arg Leu Ile Leu
        195                 200                 205

Ala Met Ala Leu Gly Ala Leu Ile Asn Gly Gly Thr Phe Ala Ala Phe
    210                 215                 220

Thr Phe Leu Ala Pro Ile Val Thr Glu Thr Ala Gly Leu Ala Glu Ala
225                 230                 235                 240

Trp Val Ser Val Ala Leu Val Met Phe Gly Ile Gly Ser Phe Leu Gly
                245                 250                 255

Val Thr Ile Ala Gly Arg Leu Ser Asp Gln Arg Pro Gly Leu Val Leu
            260                 265                 270

Ala Val Gly Gly Pro Leu Leu Leu Thr Gly Trp Ile Val Leu Ala Val
        275                 280                 285

Val Ala Ser His Pro Val Ala Leu Ile Val Leu Val Leu Val Gln Gly
    290                 295                 300

Phe Leu Ser Phe Gly Val Gly Ser Thr Leu Ile Thr Arg Val Leu Tyr
305                 310                 315                 320

Ala Ala Ser Gly Ala Pro Thr Met Gly Gly Ser Tyr Ala Thr Ala Ala
                325                 330                 335
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Leu Asn Ile Gly Ala Ala Ala Gly Pro Val Leu Gly Ala Leu Gly Leu
            340                 345                 350

Ala Thr Gly Leu Gly Leu Leu Ala Pro Val Trp Val Ala Ser Val Leu
        355                 360                 365

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Lys Thr Ala Ala Glu Ala Asn
385                 390
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<212> PRT
<213> Streptomyces venezuelae

<400> 8

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            20                  25                  30

Gly Leu Ser Ala Phe Ala Leu Gly Thr Ser Glu Phe Met Leu Ser Gly
        35                  40                  45

Leu Val Pro Pro Ile Ala Glu Asp Met Asn Val Ser Ile Pro Arg Ala
    50                  55                  60

Gly Leu Leu Ile Ser Ala Phe Ala Ile Gly Met Val Val Gly Ala Pro
65                  70                  75                  80

Leu Leu Ala Val Ala Thr Leu Arg Leu Pro Arg Lys Thr Thr Leu Ile
                85                  90                  95

Ala Leu Ile Thr Val Phe Gly Leu Arg Gln Met Ala Gly Ala Leu Ala
            100                 105                 110

Pro Asn Tyr Ala Val Leu Phe Ala Ser Arg Val Ile Ser Ala Leu Pro
        115                 120                 125

Cys Ala Gly Phe Trp Ala Val Gly Ala Ala Val Ala Ile Ala Met Val
    130                 135                 140

Pro Val Gly Ser Arg Ala Arg Ala Leu Ala Val Met Ile Gly Gly Leu
145                 150                 155                 160

Ser Ile Ala Asn Val Leu Arg Val Pro Ala Gly Ala Phe Leu Gly Glu
                165                 170                 175

His Leu Gly Trp Ala Ser Ala Phe Trp Ala Val Gly Leu Ala Ser Ala
            180                 185                 190

Ile Ala Leu Val Gly Val Val Thr Arg Ile Pro Arg Ile Pro Leu Pro
        195                 200                 205
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Glu Thr Arg Pro Arg Pro Leu Lys Asn Glu Val Ala Ile Tyr Arg Asp
    210                 215                 220

Arg Gln Val Leu Leu Ser Ile Ala Val Thr Ala Leu Ala Ala Gly Gly
225                 230                 235                 240

Val Phe Cys Ala Phe Ser Tyr Leu Ala Pro Leu Leu Thr Asp Val Ser
                245                 250                 255

Gly Leu Asp Glu Ala Trp Val Ser Gly Val Leu Gly Leu Phe Gly Ile
            260                 265                 270

Gly Ala Val Val Gly Thr Thr Ile Gly Gly Arg Val Ala Asp Ala His
        275                 280                 285

Leu Phe Gly Val Leu Leu Thr Gly Ile Ser Ala Ser Thr Val Phe Leu
    290                 295                 300

Val Ala Leu Ala Leu Phe Ala Ser Asn Pro Ala Ala Thr Ile Val Leu
305                 310                 315                 320

Thr Phe Leu Leu Gly Val Ser Ala Phe Tyr Thr Ala Pro Ala Leu Asn
                325                 330                 335

Ala Arg Met Phe Asn Val Ala Gly Ala Ala Pro Thr Leu Ala Gly Ala
            340                 345                 350

Thr Thr Thr Ala Ala Phe Asn Leu Gly Asn Thr Gly Gly Pro Trp Leu
        355                 360                 365

Gly Gly Thr Val Ile Asp Ala Asn Leu Gly Phe Ala Ser Thr Ala Trp
    370                 375                 380

Ala Gly Ala Ala Met Thr Val Leu Gly Leu Gly Ile Ala Ala Leu Ala
385                 390                 395                 400

Leu Arg Leu Thr Lys Arg Pro Ala Pro Gly His Val Val Ala Arg Ser
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Arg Gly Ala Gly Gly Thr Thr Pro Ser Glu Pro Ala Arg Gly Lys Ala
            420                 425                 430

Thr Ser Ser Cys
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<210> 9
<211> 396
<212> PRT
<213> Escherichia coli

<400> 9

```
Met Thr Thr Arg Gln His Ser Ser Phe Ala Ile Val Phe Ile Leu Gly
  1               5                  10                  15

Leu Leu Ala Met Leu Met Pro Leu Ser Ile Asp Met Tyr Leu Pro Ala
            20                  25                  30
```

```
Leu Pro Val Ile Ser Ala Gln Phe Gly Val Pro Ala Gly Ser Thr Gln
        35                  40                  45

Met Thr Leu Ser Thr Tyr Ile Leu Gly Phe Ala Leu Gly Gln Leu Ile
    50                  55                  60

Tyr Gly Pro Met Ala Asp Ser Phe Gly Arg Lys Pro Val Val Leu Gly
65                  70                  75                  80

Gly Thr Leu Val Phe Ala Ala Ala Ala Val Ala Cys Ala Leu Ala Asn
                85                  90                  95

Thr Ile Asp Gln Leu Ile Val Met Arg Phe Phe His Gly Leu Ala Ala
            100                 105                 110

Ala Ala Ala Ser Val Val Ile Asn Ala Leu Met Arg Asp Ile Tyr Pro
        115                 120                 125

Lys Glu Glu Phe Ser Arg Met Met Ser Phe Val Met Leu Val Thr Thr
    130                 135                 140

Ile Ala Pro Leu Met Ala Pro Ile Val Gly Gly Trp Val Leu Val Trp
145                 150                 155                 160

Leu Ser Trp His Tyr Ile Phe Trp Ile Leu Ala Leu Ala Ala Ile Leu
                165                 170                 175

Ala Ser Ala Met Ile Phe Phe Leu Ile Lys Glu Thr Leu Pro Pro Glu
            180                 185                 190

Arg Arg Gln Pro Phe His Ile Arg Thr Thr Ile Gly Asn Phe Ala Ala
        195                 200                 205

Leu Phe Arg His Lys Arg Val Leu Ser Tyr Met Leu Ala Ser Gly Phe
    210                 215                 220

Ser Phe Ala Gly Met Phe Ser Phe Leu Ser Ala Gly Pro Phe Val Tyr
225                 230                 235                 240

Ile Glu Ile Asn His Val Ala Pro Glu Asn Phe Gly Tyr Tyr Phe Ala
                245                 250                 255

Leu Asn Ile Val Phe Leu Phe Val Met Thr Ile Phe Asn Ser Arg Phe
            260                 265                 270

Val Arg Arg Ile Gly Ala Leu Asn Met Phe Arg Ser Gly Leu Trp Ile
        275                 280                 285

Gln Phe Ile Met Ala Ala Trp Met Val Ile Ser Ala Leu Leu Gly Leu
    290                 295                 300

Gly Phe Trp Ser Leu Val Val Gly Val Ala Ala Phe Val Gly Cys Val
305                 310                 315                 320

Ser Met Val Ser Ser Asn Ala Met Ala Val Ile Leu Asp Glu Phe Pro
                325                 330                 335
```

```
His Met Ala Gly Thr Ala Ser Ser Leu Ala Gly Thr Phe Arg Phe Gly
            340                 345                 350

Ile Gly Ala Ile Val Gly Ala Leu Leu Ser Leu Ala Thr Phe Asn Ser
        355                 360                 365

Ala Trp Pro Met Ile Trp Ser Ile Ala Phe Cys Ala Thr Ser Ser Ile
    370                 375                 380

Leu Phe Cys Leu Tyr Ala Ser Arg Pro Lys Lys Arg
385                 390                 395
```

<210> 10
<211> 512
<212> PRT
<213> Bacillus subtilis

<400> 10

```
Met Asp Thr Thr Thr Ala Lys Gln Ala Ser Thr Lys Phe Val Val Leu
  1               5                  10                  15

Gly Leu Leu Leu Gly Ile Leu Met Ser Ala Met Asp Asn Thr Ile Val
             20                  25                  30

Ala Thr Ala Met Gly Asn Ile Val Ala Asp Leu Gly Ser Phe Asp Lys
         35                  40                  45

Phe Ala Trp Val Thr Ala Ser Tyr Met Val Ala Val Met Ala Gly Met
     50                  55                  60

Pro Ile Tyr Gly Lys Leu Ser Asp Met Tyr Gly Arg Lys Arg Phe Phe
 65                  70                  75                  80

Leu Phe Gly Leu Ile Phe Phe Leu Ile Gly Ser Ala Leu Cys Gly Ile
                 85                  90                  95

Ala Gln Thr Met Asn Gln Leu Ile Ile Phe Arg Ala Ile Gln Gly Ile
            100                 105                 110

Gly Gly Gly Ala Leu Leu Pro Ile Ala Phe Thr Ile Ile Phe Asp Leu
        115                 120                 125

Phe Pro Pro Glu Lys Arg Gly Lys Met Ser Gly Met Phe Gly Ala Val
    130                 135                 140

Phe Gly Leu Ser Ser Val Leu Gly Pro Leu Leu Gly Ala Ile Ile Thr
145                 150                 155                 160

Asp Ser Ile Ser Trp His Trp Val Phe Tyr Ile Asn Val Pro Ile Gly
                165                 170                 175

Ala Leu Ser Leu Phe Phe Ile Ile Arg Tyr Tyr Lys Glu Ser Leu Glu
            180                 185                 190

His Arg Lys Gln Lys Ile Asp Trp Gly Gly Ala Ile Thr Leu Val Val
        195                 200                 205
```

```
Ser Ile Val Cys Leu Met Phe Ala Leu Glu Leu Gly Gly Lys Thr Tyr
    210                 215                 220

Asp Trp Asn Ser Ile Gln Ile Ile Gly Leu Phe Ile Val Phe Ala Val
225                 230                 235                 240

Phe Phe Ile Ala Phe Phe Ile Val Glu Arg Lys Ala Glu Glu Pro Ile
                245                 250                 255

Ile Ser Phe Trp Met Phe Lys Asn Arg Leu Phe Ala Thr Ala Gln Ile
            260                 265                 270

Leu Ala Phe Leu Tyr Gly Gly Thr Phe Ile Ile Leu Ala Val Phe Ile
        275                 280                 285

Pro Ile Phe Val Gln Ala Val Tyr Gly Ser Ser Ala Thr Ser Ala Gly
    290                 295                 300

Phe Ile Leu Thr Pro Met Met Ile Gly Ser Val Ile Gly Ser Met Ile
305                 310                 315                 320

Gly Gly Ile Phe Gln Thr Lys Ala Ser Phe Arg Asn Leu Met Leu Ile
                325                 330                 335

Ser Val Ile Ala Phe Phe Ile Gly Met Leu Leu Leu Ser Asn Met Thr
            340                 345                 350

Pro Asp Thr Ala Arg Val Trp Leu Thr Val Phe Met Met Ile Ser Gly
        355                 360                 365

Phe Gly Val Gly Phe Asn Phe Ser Leu Leu Pro Ala Ala Ser Met Asn
    370                 375                 380

Asp Leu Glu Pro Arg Phe Arg Gly Thr Ala Asn Ser Thr Asn Ser Phe
385                 390                 395                 400

Leu Arg Ser Phe Gly Met Thr Leu Gly Val Thr Ile Phe Gly Thr Val
                405                 410                 415

Gln Thr Asn Val Phe Thr Asn Lys Leu Asn Asp Ala Phe Ser Gly Met
            420                 425                 430

Lys Gly Ser Ala Gly Ser Gly Ala Ala Gln Asn Ile Gly Asp Pro Gln
        435                 440                 445

Glu Ile Phe Gln Ala Gly Thr Arg Ser Gln Ile Pro Asp Ala Ile Leu
    450                 455                 460

Asn Arg Ile Ile Asp Ala Met Ser Ser Ser Ile Thr Tyr Val Phe Leu
465                 470                 475                 480

Leu Ala Leu Ile Pro Ile Val Leu Ala Ala Val Thr Ile Leu Phe Met
                485                 490                 495

Gly Lys Ala Arg Val Lys Thr Thr Ala Glu Met Thr Lys Lys Ala Asn
            500                 505                 510
```

<210> 11
<211> 487
<212> PRT
<213> Zymomonas mobilis

<400> 11

```
Met Met Pro Asp Asp Gln Lys Asn Gly Gln Ala Asn Phe Ser Asp Val
  1               5                  10                  15

Glu Gly Met Thr Arg Gln Asn Arg Asn Gln Ala Met Gly Ala Ile Ser
             20                  25                  30

Val Ser Val Ala Met Ala Ile Leu Asp Thr Ala Ile Val Asn Thr Ala
         35                  40                  45

Leu Pro Ser Ile Ala Lys Asp Leu Gly Val Gly His Ser Asp Ser Val
     50                  55                  60

Trp Ile Ile Thr Ala Tyr Gln Met Ser Met Val Ala Ala Met Leu Pro
 65                  70                  75                  80

Phe Ala Ala Tyr Gly Asp Leu Lys Gly His Arg Lys Val Phe Leu Thr
                 85                  90                  95

Gly Leu Gly Val Phe Ile Leu Ala Ser Leu Ala Cys Gly Ile Ser Pro
            100                 105                 110

Ser Phe Leu Gly Leu Val Ala Ala Arg Phe Val Gln Gly Ile Gly Ala
        115                 120                 125

Ala Ala Ile Met Ser Ala Asn Thr Ala Leu Val Arg Gln Ile Tyr Pro
    130                 135                 140

Ala Arg Ile Leu Gly Arg Gly Leu Gly Leu Asn Ala Leu Val Met Ala
145                 150                 155                 160

Phe Ser Phe Ala Ala Gly Pro Pro Met Ala Ser Ile Ile Leu Ser Phe
                165                 170                 175

Thr Ser Trp His Trp Leu Phe Leu Ile Asn Val Pro Ile Cys Ile Leu
            180                 185                 190

Ala Phe Phe Leu Ser Trp Gln Lys Leu Pro Lys Glu Asp Lys Gly Lys
        195                 200                 205

Ser Gln Lys Phe Asp Val Val Pro Ala Val Ile Cys Ala Ser Leu Phe
    210                 215                 220

Ala Leu Trp Val His Gly Leu Gly Gln Leu Ala His Gly Ser Met Thr
225                 230                 235                 240

Ser Leu Pro Ile Ile Glu Glu Ala Val Ala Leu Ile Leu Gly Ile Phe
                245                 250                 255

Leu Val Arg Trp Gln Ser Ser His Glu Arg Pro Leu Leu Ala Val Asp
            260                 265                 270
```

```
Leu Phe Arg Ile Ser Phe Phe Ser Leu Ser Ala Ile Thr Ala Phe Leu
        275                 280                 285

Ala Phe Ile Val Gln Gly Met Ile Phe Val Ala Met Pro Phe Leu Leu
    290                 295                 300

Gln Gly Lys Leu Gly Phe Asp Val Ile Met Thr Gly Phe Leu Ile Ala
305                 310                 315                 320

Pro Trp Pro Leu Met Gly Ala Phe Leu Ala Pro Ile Ala Gly Arg Leu
                325                 330                 335

Ser Asp Arg Tyr Pro Ala Gly Ile Leu Gly Gly Ile Gly Leu Ala Ile
            340                 345                 350

Leu Gly Leu Gly Ile Gly Val Ile Ser Val Leu Pro Pro His Thr Lys
        355                 360                 365

Pro Ile Ile Ala Val Ile Met Met Ala Leu Cys Gly Gly Gly Phe Gly
    370                 375                 380

Phe Phe Leu Ser Pro Asn Gln Arg Ala Leu Met Ser Ser Ala Pro Thr
385                 390                 395                 400

Thr Arg Ser Gly Ala Ala Ser Gly Val Leu Gly Ile Ser Arg Ile Leu
                405                 410                 415

Gly Gln Thr Thr Gly Ala Thr Leu Val Ala Phe Cys Leu Tyr Leu Ser
            420                 425                 430

Ser Asp His Gly Ala Glu Ile Ala Leu Arg Ile Gly Ile Phe Ile Ala
        435                 440                 445

Phe Ala Gly Leu Tyr Gly Gln Phe Val Ala Phe Ala Glu Lys Ala Asp
    450                 455                 460

Phe Lys Lys Lys Pro Leu Leu Val Arg Leu Tyr Ser Arg Ile Lys Asn
465                 470                 475                 480

Val Pro Ser Tyr Leu Ile Phe
                485
```

<210> 12
<211> 458
<212> PRT
<213> Staphylococcus hyicus

<400> 12

```
Met Asn Thr Ser Tyr Ser Gln Ser Asn Leu Arg His Asn Gln Ile Leu
  1               5                  10                  15

Ile Trp Leu Cys Ile Leu Ser Phe Phe Ser Val Leu Asn Glu Met Val
             20                  25                  30

Leu Asn Val Ser Leu Pro Asp Ile Ala Asn Asp Phe Asn Lys Pro Pro
         35                  40                  45
```

```
Ala Ser Thr Asn Trp Val Asn Thr Ala Phe Met Leu Thr Phe Ser Ile
     50                  55                  60

Gly Thr Ala Val Tyr Gly Lys Leu Ser Asp Gln Leu Gly Ile Lys Arg
 65                  70                  75                  80

Leu Leu Leu Phe Gly Ile Ile Ile Asn Cys Phe Gly Ser Val Ile Gly
                 85                  90                  95

Phe Val Gly His Ser Phe Phe Ser Leu Leu Ile Met Ala Arg Phe Ile
            100                 105                 110

Gln Gly Ala Gly Ala Ala Ala Phe Pro Ala Leu Val Met Val Val Val
        115                 120                 125

Ala Arg Tyr Ile Pro Lys Glu Asn Arg Gly Lys Ala Phe Gly Leu Ile
    130                 135                 140

Gly Ser Ile Val Ala Met Gly Glu Gly Val Gly Pro Ala Ile Gly Gly
145                 150                 155                 160

Met Ile Ala His Tyr Ile His Trp Ser Tyr Leu Leu Leu Ile Pro Ile
                165                 170                 175

Ile Thr Ile Ile Thr Val Pro Phe Leu Met Lys Leu Leu Lys Lys Glu
            180                 185                 190

Val Arg Ile Lys Gly His Phe Gly Ser Lys Gly Ile Ile Leu Met Ser
        195                 200                 205

Val Gly Ile Val Phe Phe Met Leu Phe Thr Thr Ser Tyr Ser Ile Ser
    210                 215                 220

Phe Leu Ile Val Ser Val Leu Ser Phe Leu Ile Phe Val Lys His Ile
225                 230                 235                 240

Arg Lys Val Thr Asp Pro Phe Val Asp Pro Gly Leu Gly Lys Asn Ile
                245                 250                 255

Pro Phe Met Ile Gly Val Leu Cys Gly Gly Ile Ile Phe Gly Thr Val
            260                 265                 270

Ala Gly Phe Val Ser Met Val Pro Tyr Met Met Lys Asp Val His Gln
        275                 280                 285

Leu Ser Thr Ala Glu Ile Gly Ser Val Ile Ile Phe Pro Gly Thr Met
    290                 295                 300

Ser Val Ile Ile Phe Gly Tyr Ile Gly Gly Ile Leu Val Asp Arg Arg
305                 310                 315                 320

Val Pro Leu Tyr Ala Leu Asn Ile Gly Val Thr Phe Leu Ser Val Ser
                325                 330                 335

Phe Leu Thr Ala Ser Phe Leu Leu Glu Thr Thr Ser Trp Phe Met Thr
            340                 345                 350
```

```
Ile Ile Ile Val Phe Val Leu Gly Gly Leu Ser Phe Thr Lys Thr Val
        355                 360                 365

Ile Ser Thr Ile Val Ser Ser Ser Leu Lys Gln Gln Glu Ala Gly Ala
    370                 375                 380

Gly Met Ser Leu Leu Asn Phe Thr Ser Leu Leu Ser Glu Gly Thr Gly
385                 390                 395                 400

Ile Ala Ile Val Gly Gly Leu Leu Ser Ile Pro Leu Leu Asp Pro Arg
                405                 410                 415

Leu Leu Pro Met Glu Val Asp Gln Ser Thr Tyr Leu Tyr Ser Asn Leu
            420                 425                 430

Leu Leu Leu Phe Ser Gly Ile Ile Val Ile Ser Trp Leu Val Thr Leu
        435                 440                 445

Asn Leu Tyr Lys His Ser Gln Arg Asp Phe
    450                 455
```